

I claim:

1 1. An article of clothing for metabolic cooling and for insulation of a user in a cold environment
2 having an ambient environmental temperature which is below a comfortable skin temperature,
3 said article comprising a thermal storage material capable of storing thermal energy as the latent
4 heat of phase change dispersed therein, said thermal storage material having at least one phase
5 transition at a temperature that is less than the maximum normal skin temperature but greater
6 than ambient environmental temperature, said article to be placed in thermal contact with the
7 skin of the user so as to provide a thermal environment at a temperature above said ambient
8 environmental temperature for said user of said article for an extended time period, said thermal
9 storage material further providing a heat sink to absorb metabolic heat of user, and said
10 metabolic heat serving to recharge said thermal storage material, to thereby increase the time
11 period for which said thermal storage material provides said thermal environment at a
12 temperature above said ambient environmental temperature.

2 2. The article of clothing of claim 1, wherein said thermal storage material comprises a mixture
of at least two phase change materials having at least two different transition temperatures.

3 3. The article of clothing of claim 1, wherein said thermal storage material comprises at least
4 two layers of phase change materials with different transition temperatures.

5 4. The article of clothing of claim 1, wherein said phase change material undergoes a solid-solid
transition.

6 5. The article of clothing of claim 1, wherein said phase change material undergoes a solid-
7 liquid transition..

8 6. The article of clothing of claim 1, wherein said thermal storage material comprises a phase
9 change material absorbed in particles of an absorbing material.

10 7. The article of clothing of claim 1, wherein said thermal storage material comprises a phase
11 change material absorbed in particles of a superabsorbent material.

12 8. The article of clothing of claim 1, wherein said thermal storage material comprises phase
change materials that are encapsulated.

- 1 9. The article of clothing of claim 1, wherein said thermal storage material comprises phase
2 change materials incorporated into a flexible composite.
- 1 10. The article of clothing of claim 9, wherein said flexible composite incorporates foam.
- 1 11. The article of clothing of claim 1, wherein said thermal storage material is contained within
2 closed internal spaces in said article.
- 1 12. The article of clothing of claim 1, wherein the said thermal storage material is incorporated
2 into a fabric.
- 1 13. The article of clothing of claim 1, wherein said thermal storage material has thermal mass at
2 least equal to the difference between the heat loss from said thermal storage material to said
3 ambient environment and the metabolic heat absorbed by said thermal storage material during a
4 predetermined time period.
- 1 14. The article of clothing of claim 1 further comprising a thermal control layer between said
thermal storage material and the skin of the wearer.
- 1 15. The article of clothing of claim 1 further comprising an insulative layer between said thermal
2 storage material and the ambient environment.
- 1 16. The article of clothing of claim 1 further comprising a thermal control layer between said
thermal storage material and the skin of the wearer and an insulative layer between said thermal
3 storage material and the ambient environment, said insulative layer being of greater insulative
4 value than said thermal control layer.
- 1 17. The article of clothing of claim 1, wherein said article is selected from the group consisting
2 of a shirt, a jacket, trousers, a blanket, a gaiter, a facial mask, a hat and an earmuff.
- 1 18. The article of clothing of claim 1, wherein said article is in the form of a removable liner
2 configured to be worn in combination with other clothing.
- 1 19. The article of clothing of claim 1, wherein said article is in the form of a diver's wetsuit.